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Negative Interest Rates:
How Big a Challenge for Large Danish and Swedish Banks?

by Rima A. Turk

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I N T E R N A T I O N A L M O N E T A R Y F U N D

IMF Working Paper

European Department

Negative Interest Rates:

How Big a Challenge for Large Danish and Swedish Banks?

Prepared by Rima A. Turk¹

Authorized for distribution by Craig Beaumont

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Abstract

Negative policy interest rates have prevailed for some years in Denmark and are a more recent development in Sweden. Among other potential side effects, negative rates could weaken banks' profitability by reducing net interest income, their main source of earnings. However, an analysis of financial statements at the country rather than the consolidated group level shows that bank margins have been broadly stable. At least to date, lower interest income was offset by reductions in wholesale funding costs and higher fee income. Nonetheless, the impacts on bank health and lending from negative interest rates will need to continue to be monitored closely.

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I. INTRODUCTION

With the introduction of negative policy interest rates in Denmark and Sweden, there have been concerns about their impact on bank profitability. While intended to support macroeconomic objectives, negative interest rates can put pressure on banks' net interest margins, which are key to their profitability. The effects could be even more pronounced for banks that are unable to generate greater revenues such as by charging fees to depositors (Vinals, Eckhold, and Gray, 2016). In turn, a reduction in bank profitability would be of concern if it were to impede lending and growth.

Declining interest rates tend to squeeze banks' interest margin over time. There is a small but growing literature on the effects of interest rates on bank profits. Alessandri and Nelson (2015) and Busch and Memmel (2015) find that, in the long-run, there is a positive relationship between the level of interest rates and bank profitability, but the short-run impact of higher rates can be negative owing to repricing frictions faced by banks. Borio, Gambacorta, and Hofmann (2015) warn that low interest rates and a flat term structure might significantly erode bank profitability and that there could be significant non-linearities in this relationship, with rate cuts having larger effects if starting from already low levels. However, Genay and Podjasek (2014) argue that the positive impacts from boosting economic activity, including on lending volumes and on the performance of existing loans, may outweigh the adverse effects of low or negative interest rates on bank profitability.

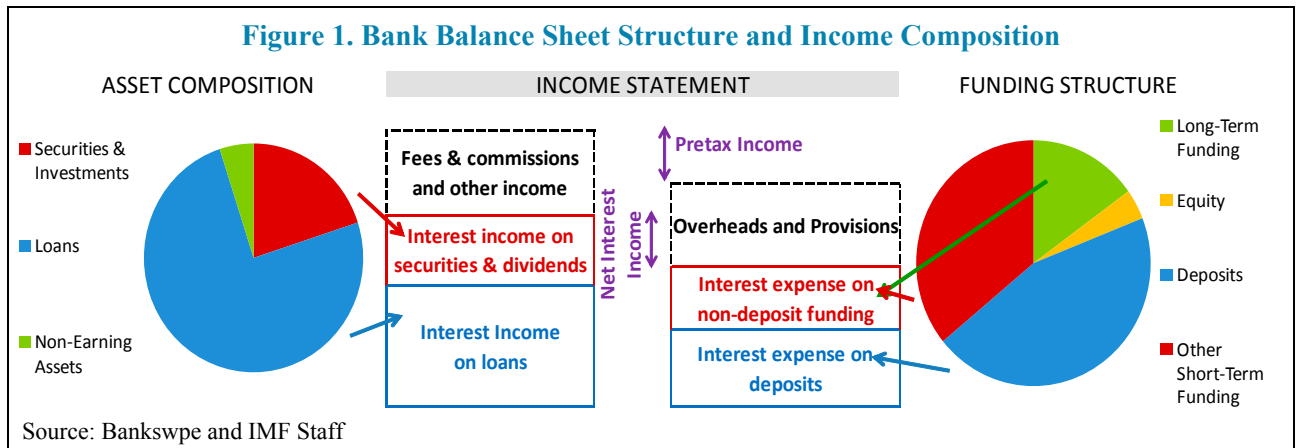
Downward stickiness in deposit rates at low policy rates is a key factor shaping the impact of negative rates on bank profitability, but other factors also play a role (Figure 1). Banks have generally avoided applying negative interest rates to retail deposits, likely owing to concerns about customer relations as well as deposits moving to other banks.² This source of downward stickiness in funding costs implies the potential for net interest margins to be squeezed as lending rates fall in response to negative policy rates. However, other factors can in practice play a significant role in shaping the impact of negative interest rates:

- **Funding composition:** Costs of wholesale funding for banks will tend to fall as negative policy rates impact money markets and the yield curve. A larger share of wholesale funding will thus reduce the impact of negative rates on the overall net interest margin. If the cost of wholesale funding is more closely linked to current market rates—owing to short maturities, floating rate liabilities, or interest swaps on fixed rate bonds—then funding cost savings will accrue more quickly.
- **Asset repricing:** Income from loan portfolios will decline faster if the share of variable rate loans is high, such that lending rates on existing loans decline as well as those on

² There is no evidence of cash hoarding by customers in Denmark and Sweden (BIS, 2016).

new loans.³ Further, the option to refinance loans at new lower interest rates may result in a similar effect even where rates on outstanding loans are not variable.

- **Other income sources:** Overall bank profitability also depends on income from other sources, such as from security holdings, asset management, fees and commissions as well as non-interest expenses in the form of operating costs and loan loss provisions.



This paper first assesses the pass-through of low and negative interest rates into bank interest rates and wholesale funding costs in Denmark and Sweden. It describes developments in retail interest rates in Denmark and Sweden, providing information on stickiness and repricing. It also estimates wholesale funding costs at Swedish banks, where non-deposit funding supports about half of loans.

The study also examines developments in the earnings of the main subsidiaries of large banks in Denmark and Sweden during the period of negative interest rates.⁴ At the group level, banking conglomerates seem to be weathering well the challenges of operating in a negative interest rate environment (Danmarks Nationalbank, 2015a; Sveriges Riksbank, 2016a).⁵ They are profitable and well capitalized (Box 1), so there is no immediate threat from negative rates to their overall financial soundness. Yet, bank activities spread across different markets, which could mitigate the effect from potential interest rate compression in their domestic operations. Large banks also operate across different business segments, such as commercial

³ Currently, 50 percent of bank loans in Denmark and more than 90 percent of bank loans in Sweden carry a variable rate with short-term fixation period less than one year.

⁴ For a comprehensive review of how all banks in Denmark, systemic or otherwise, are affected by negative interest rates, see DN (2015a). For the effect on all financial institutions in Sweden, see Gibas and others (2015).

⁵ Additional analyses for Sweden indicates that profitability has been high and stable during the phases of interest rate cuts in recent years (Sveriges Riksbank, 2016b).

banking or mortgage financing, which may be impacted differently by negative interest rates due to differences in funding structures, loan repricing, and other income sources.

The rest of the paper is structured as follows. Section II provides a brief overview of negative interest rates in Europe, shedding light on the motivation behind their introduction. Section III discusses the pass-through of negative interest rates to bank rates and wholesale funding costs. Section IV analyzes the impact of negative interest rates on commercial banks (CB) and mortgage banks (MB), by examining the evolution of bank earnings and key financial ratios over time. Section V presents financial market reactions to negative interest rates to summarize investors' views on their impact on banks. Section VI concludes.

II. BRIEF OVERVIEW OF NEGATIVE INTEREST RATES IN EUROPE

Four central banks in Europe have steered nominal rates into negative territory since 2012.⁶ The Danmarks Nationalbank (DN) was the first to introduce negative policy rates on its deposit facility in July 2012, followed by deeper cuts in early 2015. Then, the deposit rate at the European Central Bank (ECB) turned negative from June 2014, the 3-month Libor target rate at the Swiss National Bank (SNB) followed suit in December 2014, and the policy rates of Sweden's Riksbank (RB) became negative in early 2015 (Table 1 and Figure 2). As discussed below, negative rates were introduced for different reasons in those countries, reflecting their policy frameworks. With these steps, the DN, ECB, RB, and SNB have generated negative interest rates in money markets, breaking through the former "zero lower bound" constraint on monetary policy (Gray, 2015).⁷

In Denmark, which pegs to the euro, negative rates were introduced to penalize capital inflows and deter speculators. In 2012, fears of an intensification of distress in the euro area drove sizable capital inflows into Denmark, requiring large foreign exchange purchases by the DN to maintain the peg. To moderate these inflows and contain the volume of purchases, the DN cut the policy rate and set the interest rate on certificates of deposit (CD) at a modestly negative level from July 2012 through early 2014; initially at -0.2 percent, the CD rate was raised to -0.1 percent in January 2013. After briefly exiting negative rates, the DN returned to a negative CD rate in September 2014 after the ECB began to implement a negative rate on its deposit facility.

Danish rates were cut substantially in early 2015 after the SNB changed its exchange rate policy and the ECB announced the expanded asset purchase program. Large capital inflows followed the SNB's decision to remove its euro ceiling and the ECB announcement in January 2015. The DN responded with massive foreign exchange rate purchases (amounting to 13 percent of GDP) to preserve the peg. In parallel, the DN announced a -0.5 percent CD rate in

⁶ The Bulgarian National Bank imposed a negative interest rate on banks' excess reserves in January 2016 and the National Bank of Hungary cut its overnight deposit rate to -0.05 percent in March 2016 (Jobst and Lin, forthcoming).

⁷ The discussion of setting negative policy rates began with Mankiw (2009). Regarding the effectiveness of negative nominal policy interest rates and their potential distortions, see Gray (2015).

January 2015 that was soon cut to -0.75 percent, which fed into negative money market interest rates and bond yields. These costs to investors, together with the firm commitment of the DN to the peg, meant the inflows abated then unwound over time.

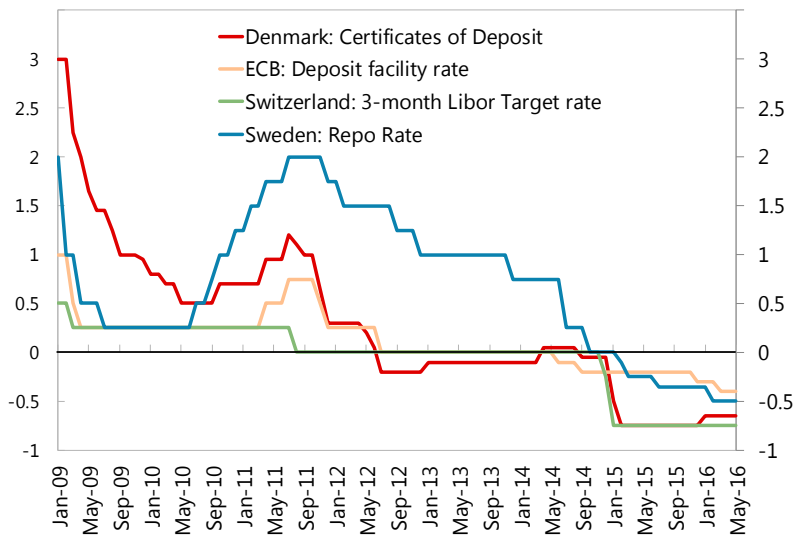
Table 1. Negative Policy Rates in Europe (in percent)

Country	Date negative rate introduced	Policy rates as of May 2016 (basis points) 1/		
		Marginal lending facility	Policy rate	Deposit facility
Danish National Bank	Jul-12 to Apr-14; Sep-14 onwards	5	0	-65
European Central Bank	Jun-14	25	0	-40
Swiss National Bank	Jan-15	50	-	-75
Sveriges Riksbank	Feb-15	25	-50	-125

Source: Adapted from Vinals, Gray, and Eckhold (2016).

1/ Shaded cells refer to the most relevant short term money market rates.

Figure 2. Negative Policy Rates in Europe (in percent)



Sources: Haver.

Negative policy rates in Sweden were part of a package of measures to protect the credibility of its inflation target. In contrast with Denmark, the Swedish krona is floating. Inflation had been low for some years culminating in inflation expectations falling sharply in late 2014, with 2-year ahead expectations hitting 1.2 percent by January 2015, well below the 2 percent target. In February, the RB responded with the simultaneous adoption of negative rates, quantitative easing (QE), and forward guidance in order to raise inflation and reverse the fall in inflation expectations. Subsequently, the RB cut the repo rate in a number of steps, at times in conjunction with announcing additional bond purchases (Table 2).

Table 2. Unconventional Monetary Policy Actions in Sweden

Date	Repo rate (basis points)	New QE (SEK bn)
Feb-15	-10	10
Mar-15	-25	30
Apr-15		40-50
Jul-15	-35	45
Oct-15		65
Feb-16	-50	
Apr-16		45

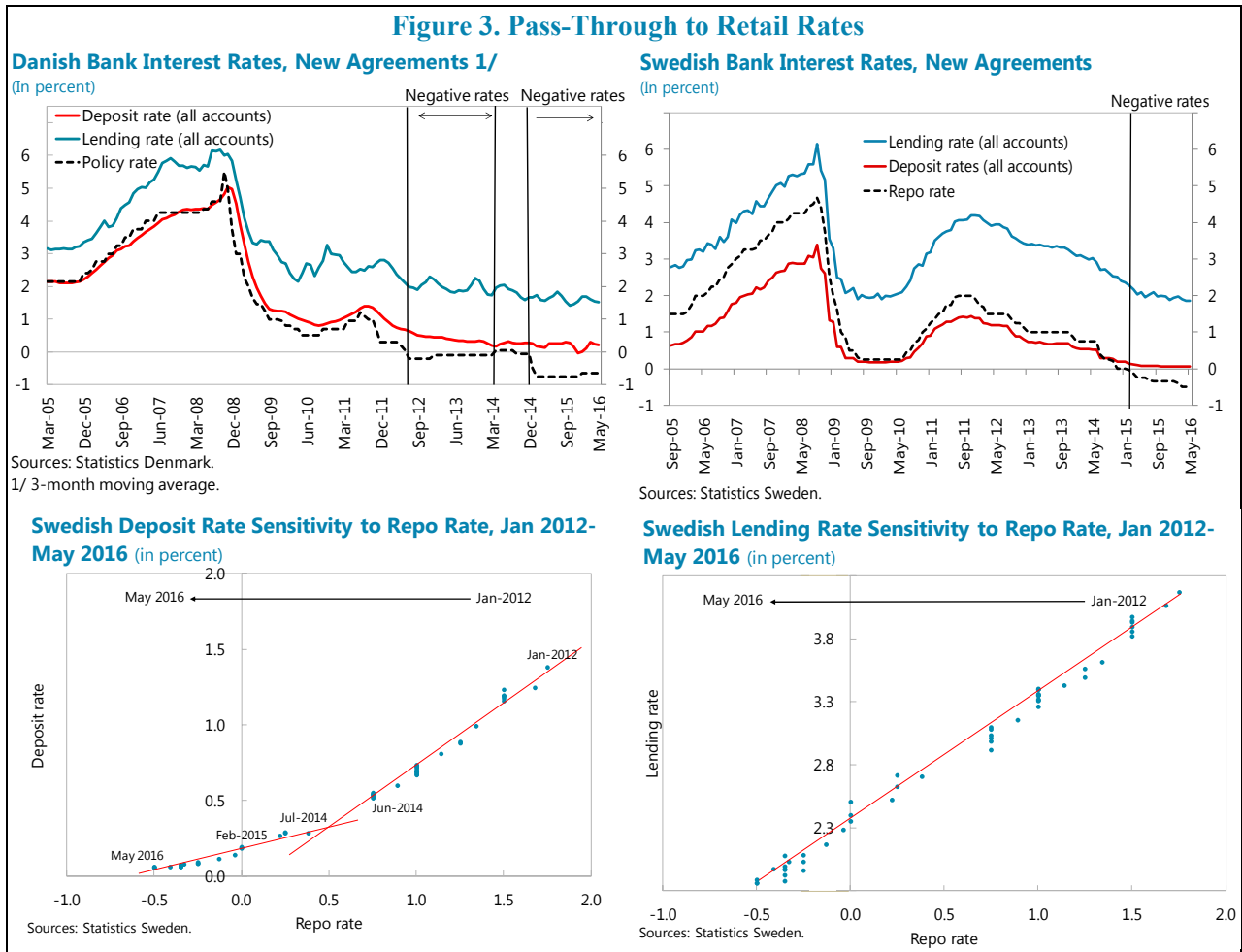
Source: Sveriges Riksbank

III. PASS-THROUGH OF POLICY RATES TO BANK RATES AND WHOLESALE FUNDING COSTS

Data on bank lending and deposit rates point to downward stickiness in deposit rates emerging once policy rates are low, albeit not yet negative (Figure 3). In both Denmark and Sweden, interest rates on new deposit agreements have declined, but remained at or above zero even when the policy rate became significantly negative.⁸ Banks in both countries have avoided passing on negative rates to retail clients —banks in Sweden refer to reaching a “zero floor”. Indeed, even before the Danish and Swedish central banks went into negative territory, the rate of decline in deposit rates on new agreements decelerated relative to the pace of cuts in the policy rate. So the potential for downward deposit rate stickiness to affect net interest margins may emerge at low policy rates, rather than being a feature specific to negative rates. To illustrate, sensitivity of retail deposit rates in Sweden to the repo rate appears to have declined after the latter dropped below 0.5 percent in July 2014.

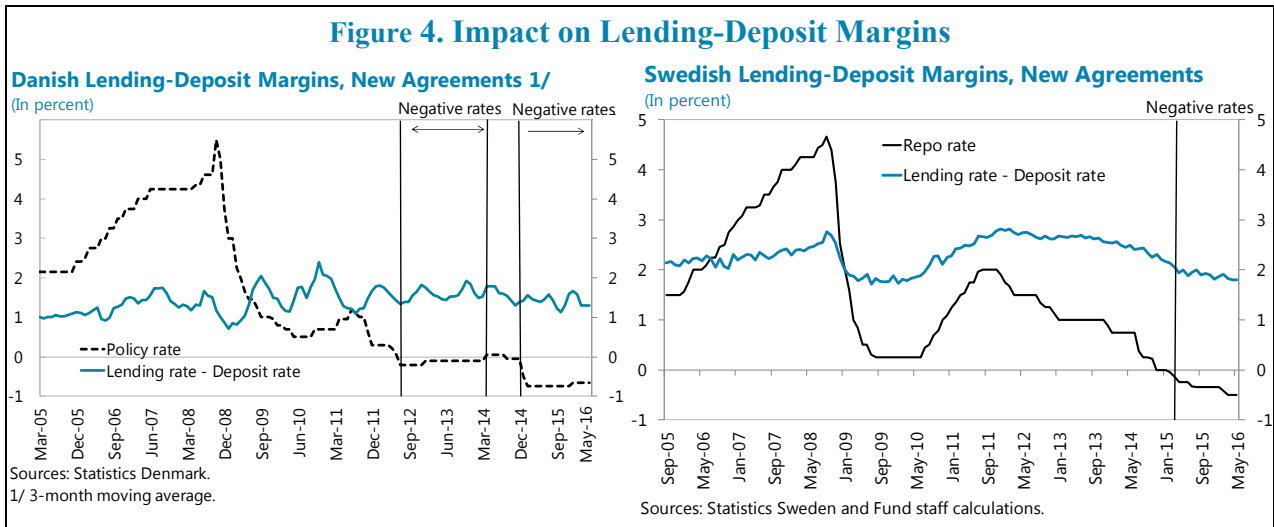
Lending rates declined in both countries, yet the fall was larger in Sweden. The interest rate on new loan agreements in Sweden declined broadly in parallel with the path of the policy rate after the introduction of negative rates in February 2015, showing a similarly close relationship to that evident prior to negative rates (Figure 3). In contrast, the pass-through to lending rates in Denmark seems less pronounced, as lending rates were broadly unchanged on average following the notable rate cut to -75 basis points. However, alternative analysis by DN (2016b) shows that changes in lending rates for each of non-financial corporations and households has followed closely the decline in the CD rate, suggesting a closer pass-through.

⁸ A similar picture emerges when examining reported interest rates on all outstanding deposit agreements. However, aggregate rates hide wide variation within deposit rates for different customers. For example, a majority of larger corporate deposits in Denmark have already turned negative and imposition of negative interest rate on deposits for small and medium enterprises is becoming more common. In Sweden, only some large corporates and institutional clients earn negative deposit rates.



Aggregate lending-deposit margins remained steady in Denmark since the introduction of negative rates (Figure 4, top panel). Between July 2012 and March 2016, margins between bank lending and deposit rates in Denmark averaged 1.5 percent, in line with the mean in the three years before negative rates. Also, these margins have not hit the bottom that they had reached during the global financial crisis.

In Sweden, by contrast, margins between lending and deposit rates have narrowed (Figure 4, bottom panel). In 2011–14, margins between lending and deposit rates averaged 2.6 percent, but they fell to just below 2 percent since February 2015 as deposit rate declines slowed relative to lending rate decreases. Such a level for margins is similar to that seen earlier when repo rates were low by historical standards, in both in 2005 and after the global financial crisis.



Developments in the costs of wholesale funding significantly affect bank profitability.

Although data on interest rates reported by banks have broad coverage of bank lending and deposits, banks have a range of additional assets and liabilities. Most importantly, Danish and Swedish banks rely on substantial funding from wholesale sources, including money market funding and covered bonds. Developments in the costs of this non-deposit funding significantly affect bank profitability but are not captured by data on bank rates.⁹

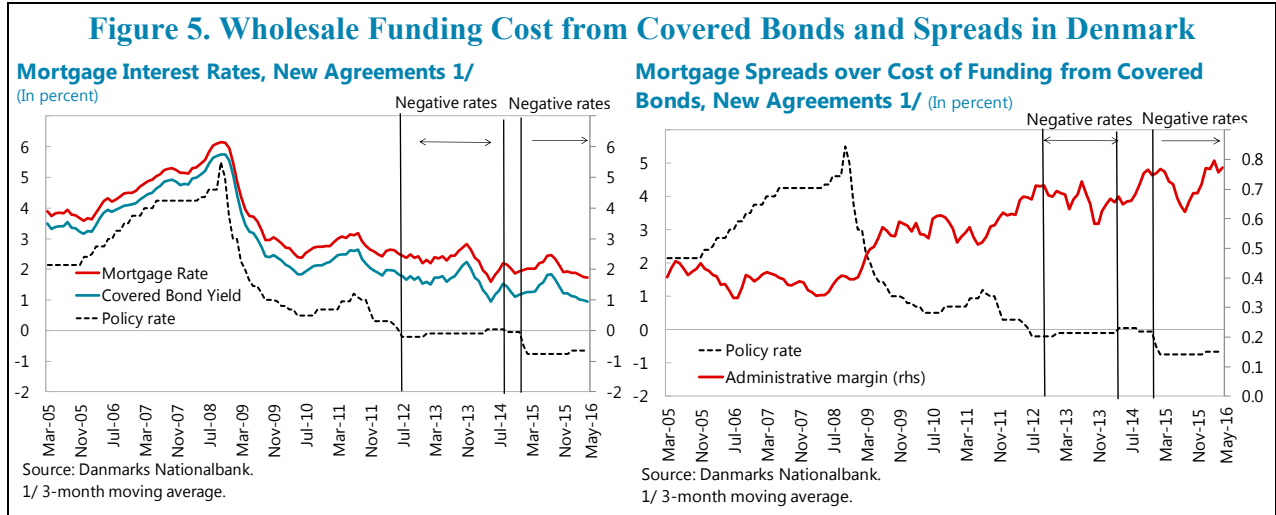
In Denmark, spreads that are earned over covered bond financing are not impacted by negative interest rates. MB in Denmark finance housing loans solely by issuing covered bonds, adhering to the so-called “balance principle” in providing mortgages. As a result, they realize a set administrative fee from mortgage loan origination and servicing (Figure 5). As discussed below, additional income from an increase in fees since negative interest rates were introduced has contributed to solid margins for MB.

In Sweden, banks rely heavily on non-deposit funding to finance their activities, including foreign currency funding swapped into Swedish Krona (SEK).¹⁰ Wholesale funding in Sweden comes primarily from issuing money-market instruments and covered bonds in both domestic and foreign currency. To diversify the investor base, benefit from cheaper foreign currency funding, and provide clients with foreign currency loans, banks issue covered bonds in foreign currency (Hilander, 2014). More importantly, they swap their liability into SEK to match their lending in domestic currency (Eklund, Milton, and Rydén, 2012). To hedge the

⁹ Neither data on bank rates and wholesale funding costs cover changes in security returns or fee income.

¹⁰ The structure of bank funding in Sweden has remained stable over the past 5 years, with deposits and non-deposit funding sources at 48 and 52 percent, respectively.

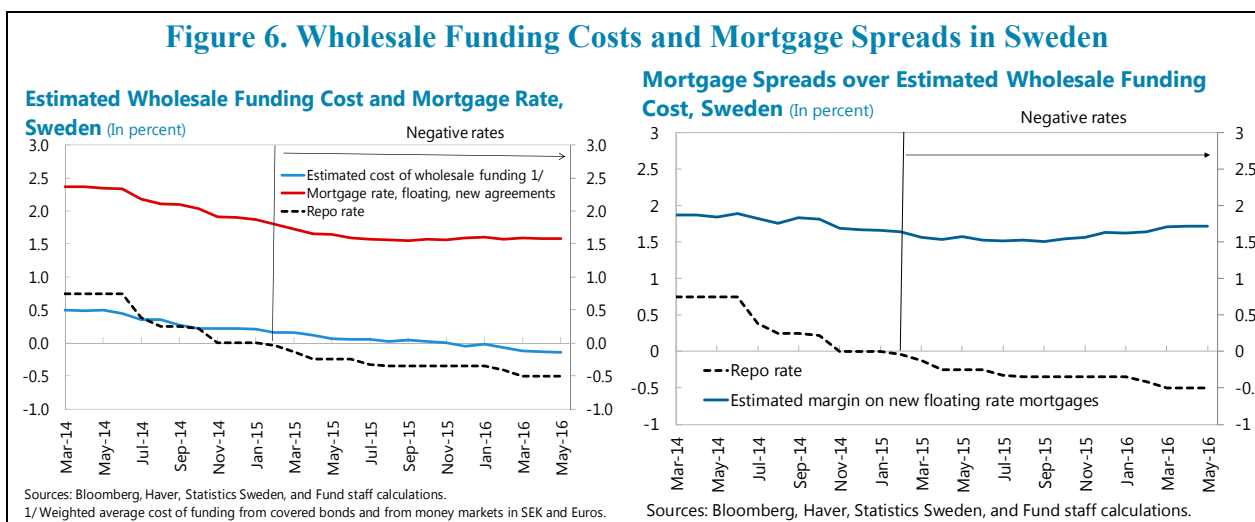
interest rate risk between covered bonds and mortgages that predominantly have variable rates with short fixation periods, banks use interest rate swaps



Estimates of overall funding costs from covered bonds have continued to fall in line with the repo rate since the introduction of negative interest rates (see Appendix I). The pass-through from negative interest rates to money market rates and estimates of funding costs on covered bonds both in Swedish Krona and Euro has been sizable since negative rates were introduced. Taking account of the shares of new covered bond issuance in domestic and foreign currency, the decline in total funding cost on covered bonds closely matched the reduction in the repo rate since February 2015.

Overall, reductions in wholesale funding costs since February 2015 have safeguarded bank margins. In contrast with the stickiness of deposit rates, the overall cost of wholesale funding—reflecting the combination of short-term funding and use of long-term funding with hedging of interest and FX risks—has decreased since negative interest rates were introduced in Sweden (Figure 6, left panel). Hence, despite the reduction of mortgage lending rates after negative rates were introduced, wholesale funding cost compression has helped maintain margins on mortgages (Figure 6, right panel).¹¹

¹¹ While the decline in the cost of wholesale funding has averted the potential squeeze in interest rate margins, the use of non-core liabilities could raise financial stability concerns, since this type of funding is more unstable and prone to sharp reversals in time of crisis.



IV. BANKING IN A NEGATIVE INTEREST RATE ENVIRONMENT

This section focuses on the developments in key financial indicators of large Danish and Swedish bank subsidiaries during the period of negative rates. The analysis rests on unconsolidated financial statements (Box 1) for CB and MB retrieved from the Bankscope database over the period 2005–15.¹² CB offer a broader range of products such as unsecured and secured loans, overdrafts, investment products, checking accounts, and term deposits. In contrast, MB do not accept deposits and they specialize in originating and/or servicing mortgage loans, earning a spread between mortgage funding costs and mortgage lending rates in the form of loan servicing and origination fees.

CB in Denmark and Sweden have different asset-liability structures but mortgage banks in the two countries appear to be more similar (Figure 7). Danish CB hold a notably larger portion of their assets in securities (rather than loans) than Swedish CB. In both countries, customer deposits account for less than half of funding implying that a range of wholesale funding sources are utilized. Among these, Swedish CB make greater use of long-term funding, consistent with the lower liquidity of their assets compared with Danish CB. For MB in both Denmark and Sweden, almost all assets are invested in mortgage loans and funding is primarily long-term rather than short-term.

¹² The sample includes 4 large CB from Denmark and Sweden, and 4 and 3 MB from Denmark and Sweden, respectively (see Appendix II for the list of banks). For an analysis of all Danish banks grouped by their systemic nature, see DN (2015a).



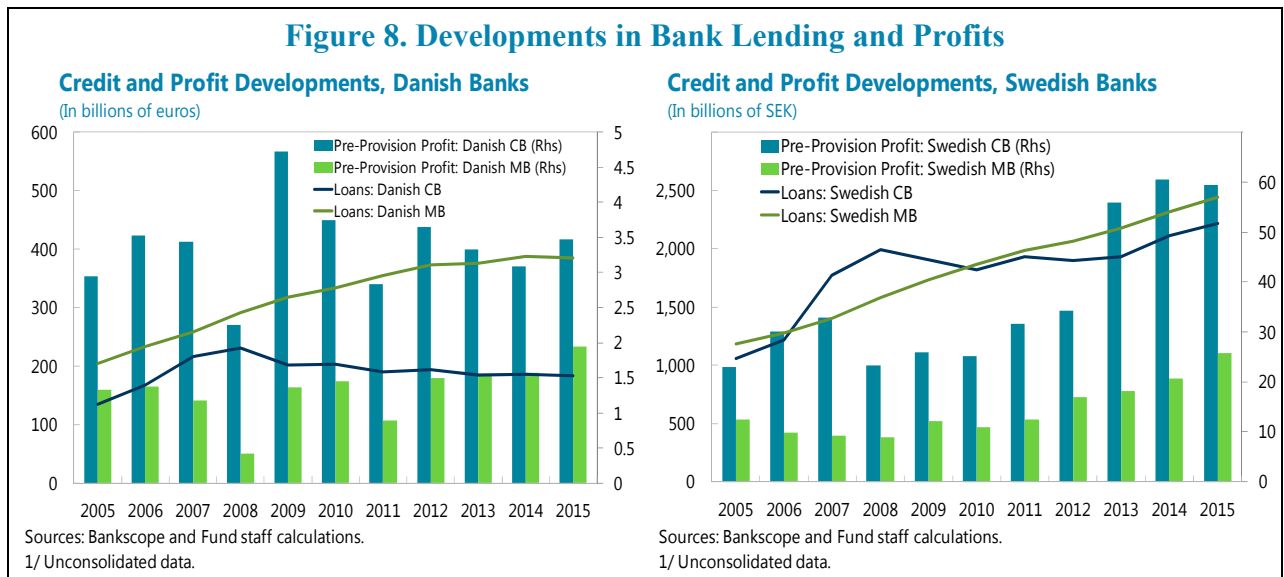
Credit trends do not appear to have changed after interest rates went into negative territory (Figure 8). In Denmark, CB lending has declined since 2008, probably reflecting debt overhangs from the pre-crisis boom and it has slowed for MB since 2012 due to subdued demand (DN, 2015b and 2016a).¹³ In contrast, lending in Sweden continued to expand during

¹³ Subdued demand for loans in Denmark has to be viewed in the context of high lending relative to GDP, which has not decreased in recent years despite a strong increase pre-crisis (DN, 2015b). However, there is widespread

(continued)

2015—the first year into negative interest rates (Gibas and others, 2015), supporting bank profits in Krona terms.

There are no clear signs of adverse impact on headline profits (Figure 8). Bank profits continued their upward trend in Swedish MB in 2015, while remaining stable for Danish MB in 2012—14 and then increasing in 2015 when rates were most negative. After a gradual decline in profits between 2012 and 2014, CB in Denmark also registered strong results in 2015. For Swedish CB, profits slightly declined in 2015 albeit remaining close to historic highs. The following analysis seeks to identify the factors underlying bank performance.

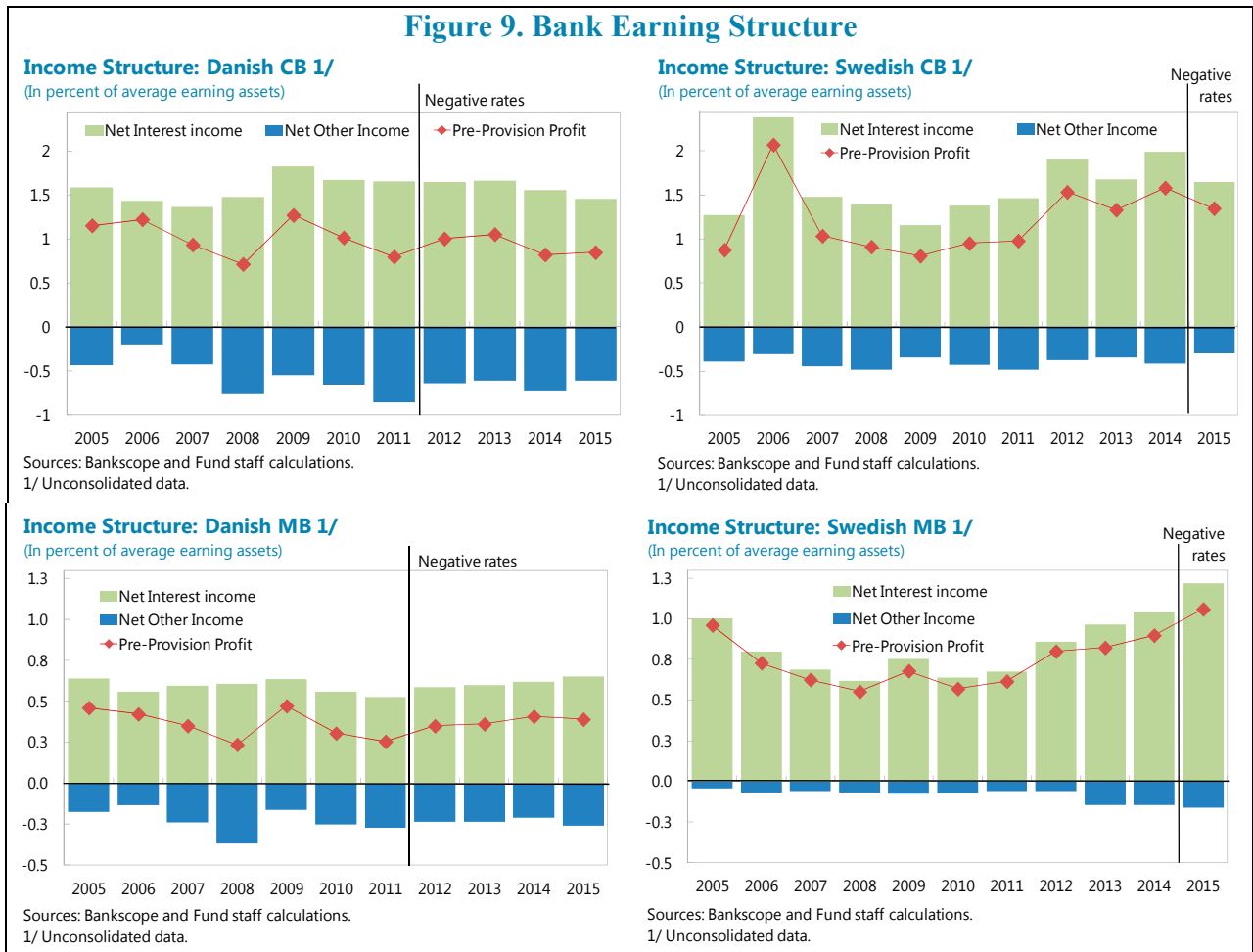


Controlling for asset growth, bank profitability has remained broadly stable since the introduction of negative interest rates while it rose for MB in Sweden (Figure 9).¹⁴ For banks in Denmark and CB in Sweden, net interest margins (NIM)—measured as net interest income to average earning assets—and net other income remained near their averages prior to the period of negative interest rates. In contrast, MB profitability in Sweden rose since negative

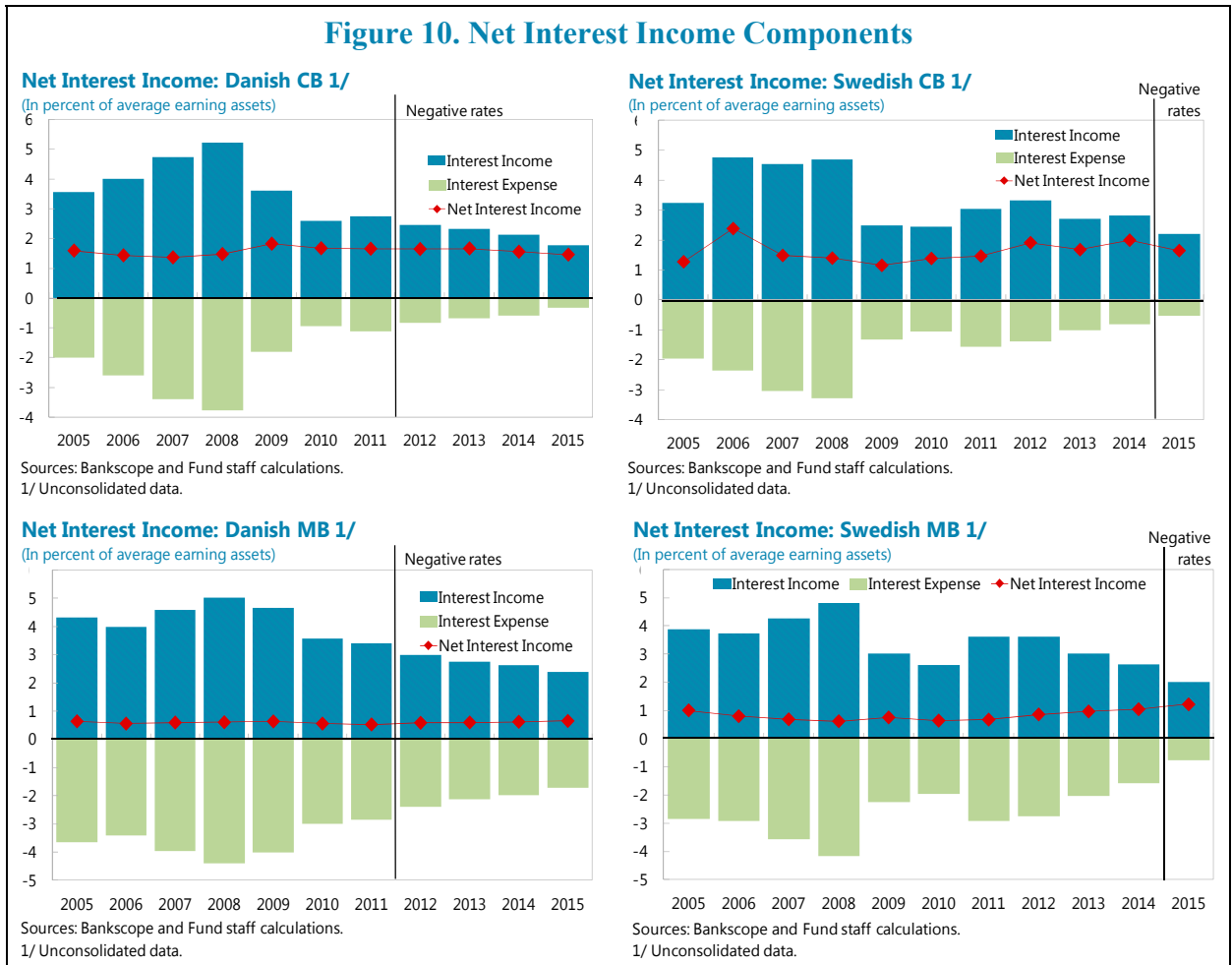
interchangeability between CB and MB lending in Denmark, not least for household credit. Also, aggregate credit developments disguise differing underlying trends, as commercial bank lending to households continued to be subdued in 2015 whereas it picked up in business banking. As regards more recent developments, there seems to have been a positive trend in credit growth in 2016 (DN, 2016b).

¹⁴ The analysis of bank profitability abstracts from the effects of provisions on the bottom line, as discretion in the timing of recognition of provisions may mask the effect of negative interest rates on bank financial health, which is what this paper attempts to investigate. To illustrate, Danish have banks achieved in 2015 the highest profit since the financial crisis at a time where the loan impairment charge ratio was substantially lower than the average over the last three decades (DN, 2016a). Yet part of the reductions in provisions could reflect the completion of loss recognition from the prolonged recession rather than a benefit of negative rates.

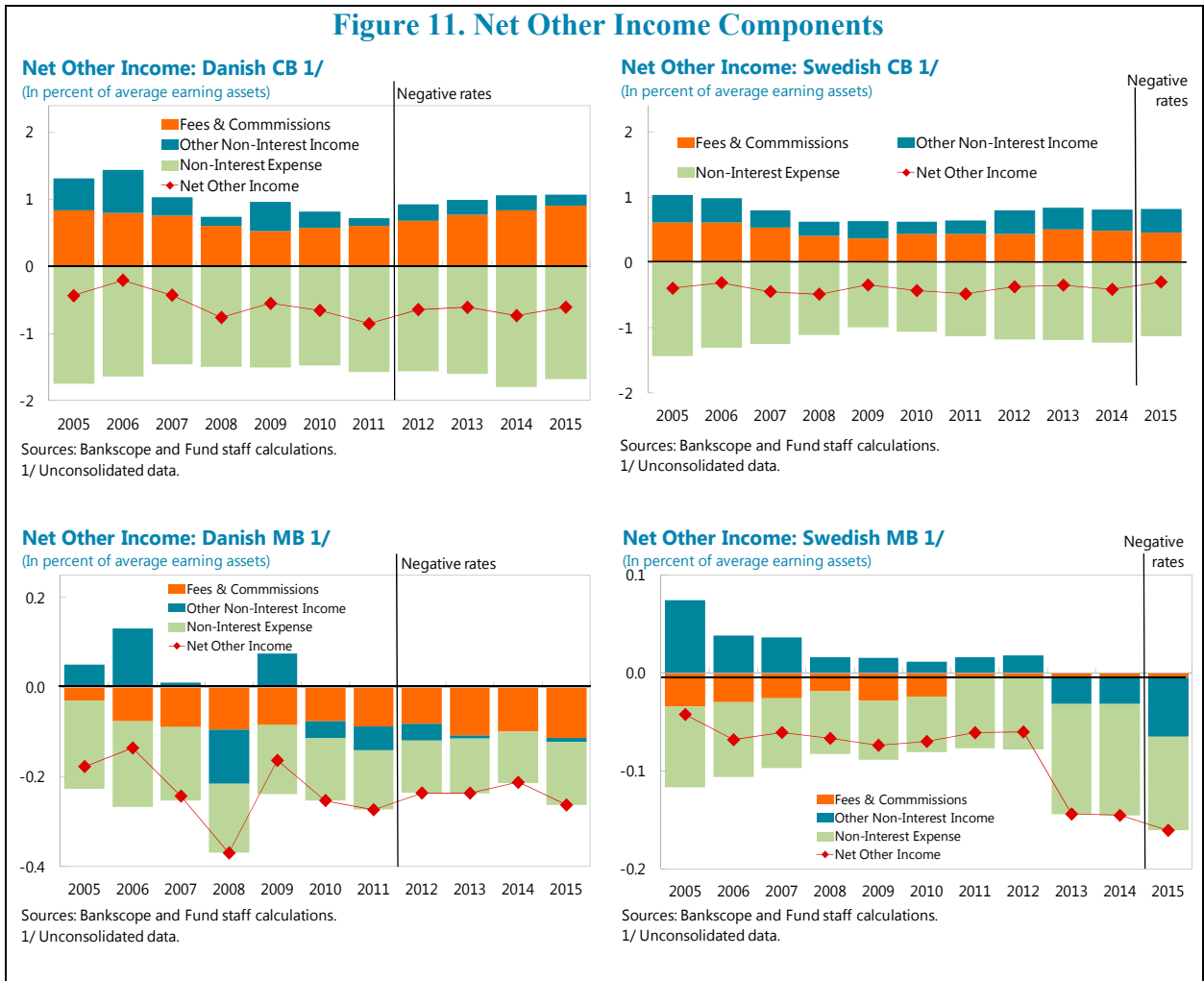
interest rates were introduced early 2015, maintaining their upward trend in recent years. This rise is driven by higher NIM, where net other income stayed at its previous level.



Stable NIM are attributed to steady declines in bank interest expenses (Figure 10). Interest income relative to assets declined for all banks in recent years, reflecting the strong pass-through from negative interest rates to lower lending rates. Another common feature to all banks is a significant reduction in interest expenses, which are at historic lows in relation to earning assets. Considering that deposit rates declines have been limited during this period, interest expense reductions must be largely attributable to reduced costs from non-deposit funding. Such a decline is especially pronounced at MB in Sweden in 2015, owing to the combination of cheaper short-term funding and use of interest swaps on long-term funding, whereas the reduction was more gradual in Denmark.

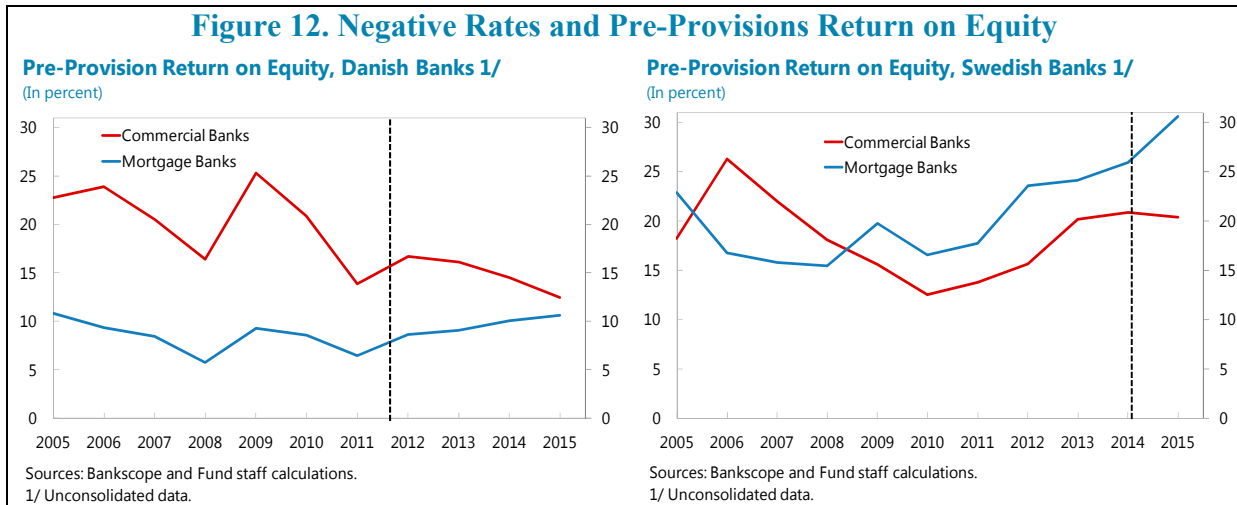


Net other income improved only slightly for CB whereas it was little changed for MB relative to recent years, such that overall profitability was little affected (Figure 11). During the period of negative interest rates, Danish CB have raised substantially more income from fees and commissions, although these gains were partly offset by higher non-interest expenses, such that the improvement in net other income was limited compared with typical levels prior to negative rates. Non-interest sources of revenues such as from fund management and advisory services remained steady for CB in Sweden in 2015, with only a small improvement in net other income owing to reduced non-interest expenses. Since MB activities are limited to mortgage lending, non-interest income and non-interest expense are less prominent in their earning structure, and changes in their net other income were small.



Overall, there has been no noticeable impact on banks' bottom line following the introduction of negative interest rates (Figure 12). Whereas the pre-provision return on equity (ROE) slightly declined for CBs in Denmark, it remained flat for CB in Sweden after negative interest rates were introduced, albeit at a high level. As for the business model of MB, it was not affected by negative interest rates.¹⁵ To the contrary, the pre-provision ROE for MB rose to its 2005 high in Denmark, and its strong upward trend in Sweden continued.

¹⁵ Mortgage banks may face practical challenges with implementing negative rates for existing floating-rate mortgage bonds, although no significant problems are yet identified in relation to adjustable-rate loans. The report published by the task force set up by the Ministry for Business and Growth early 2015 to identify potential issues with negative interest rates left it to individual mortgage banks to deal with negative interest rates. The Danish tax authorities also issued guidelines describing the taxation and deductibility of negative interest.

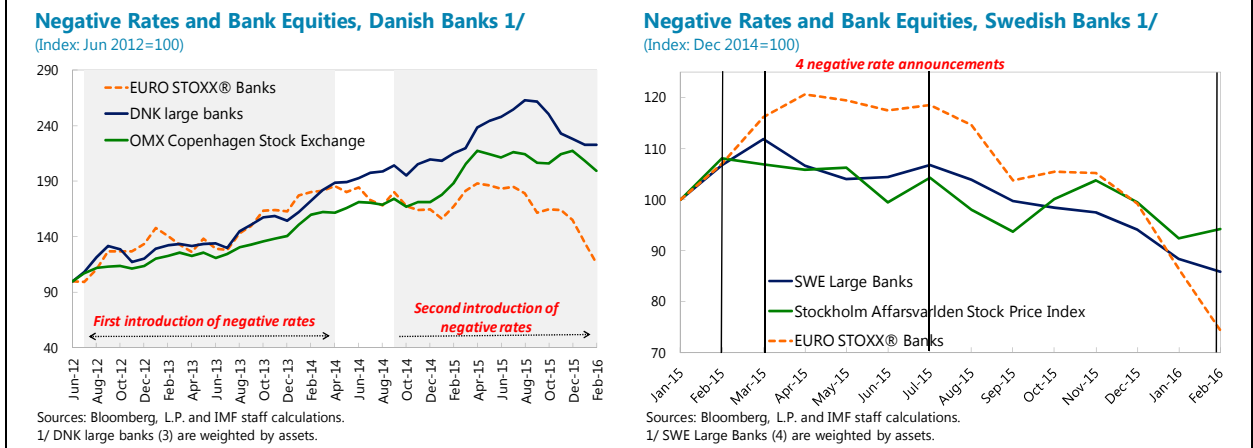


It could be that the full effect from negative rates on CB profits remains to be observed. In both countries, policy rates only became significantly negative in 2015, such that the adverse impact on interest revenues may increase in coming years as that portion of loans that have longer rate fixing periods are repriced and maturing loans are rolled over at the lower prevailing rates. At the same time, there may be limits to banks' ability to further increase their non-interest revenues in the form of fees. The room for further cost reduction from interest expense compression could also be restricted with deposit rates floored, and signs of less than complete pass-through of negative rates into wholesale funding costs.

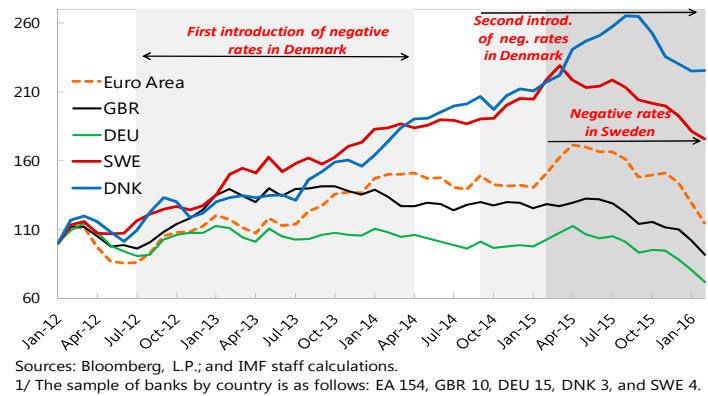
V. FINANCIAL MARKET REACTION TO NEGATIVE INTEREST RATES

Equity markets do not signal that the value of Danish and Swedish banks is adversely impacted by negative rates.¹⁶ Since the first introduction of negative rates in Denmark in July 2012, equity prices for Danish banks have persistently outperformed the OMX Copenhagen stock market index and, as of September 2014, their strong performance outpaced the record of European banking stocks (Figure 13, left panel). As for Swedish bank equities, their returns remained broadly in line with the Stockholm stock market index since rates turned negative, but lower than for European bank stocks until the fall of 2015 (Figure 13, right panel). Swedish bank equities were affected by the market volatility in early 2016, yet it is notable that that the impact was much less than that observed for European banking stocks. It should be noted that equity prices are at the consolidated group level, such that potential adverse effects within subsidiaries in countries most affected by negative rates may be mitigated by developments elsewhere in these regional banking groups.

¹⁶ Among the Danish and Swedish banks considered, Nordea is designated as a Global Systemically Important Bank (G-SIB), whereas the other large Swedish banking groups (Svenska Handelsbanken, Skandinaviska Enskilda Banken (SEB) and Swedbank) and Danske Bank are identified as other systemically important institutions, using the EBA guidelines. DN additionally considers Nykredit Realkredit, Nordea Bank Danmark, Jyske Bank, Sydbank, and DLR Kredit as systemic financial institutions.

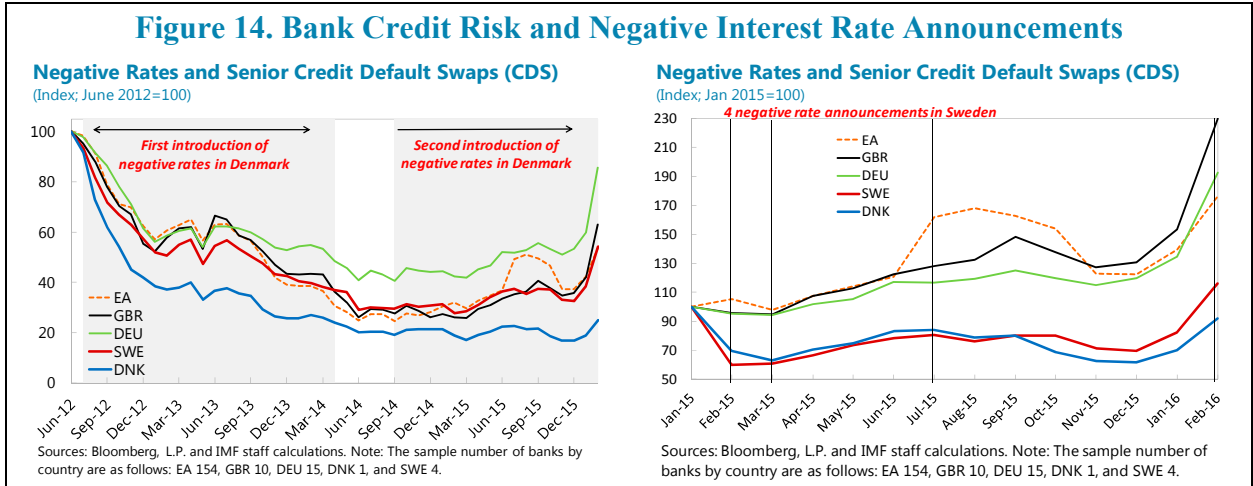
Figure 13. Limited Effect on Bank Equity Prices from Negative Rates

Put in perspective, Danish and Swedish banks have outperformed peers since January 2012. In the four years since the first introduction of negative rates in Denmark in January 2012, bank equity prices rose by 125 percent in Denmark and by 76 percent in Sweden, compared to a 15 percent increase for the euro area and declines of 8 and 28 percent for the UK and Germany, respectively.

Negative Rates and Bank Equities in Europe 1/
(Index: Jan 2012=100, weighted by bank assets)

Similarly, the pricing of bank credit risk does not indicate that negative rates are a source of debt repayment or solvency risk for banks in Denmark and Sweden. The change in counterparty credit risk reflected in spreads in credit default swaps (CDS) has been lowest in Denmark since the first introduction of negative rates (Figure 14, left panel). Similarly in Sweden, the series of negative rate cuts do not seem to have had any impact on bank CDS spreads, notably at a time where spreads for banks from Germany, the U.K., and the broader EA have spiked. (Figure 14, right panel).¹⁷ As for the recent rise in CDS spreads in Denmark and Sweden, it is driven by a broader repricing of bank credit risk.

¹⁷ For Danish banks, CDS spreads are available only for Danske Bank A/S.



VI. CONCLUSION

At least to date, negative interest rates in Denmark and Sweden have not posed a challenge for bank profitability. There has been some compression of margins between banks' lending and deposit rates, as deposit rates showed downward stickiness when rates reached low levels, while lending rates declined with policy rates, although a smaller lending rate decline limited margin compression in Denmark. Yet, the analysis found that the profitability of banks in the two countries has remained broadly stable, and even increased for MB in the single year that negative rates prevailed in Sweden. High reliance on non-deposit funding in these countries coupled with a sizable pass-through from negative policy interest rates to the cost of wholesale financing have cut overall interest expenses to historically low levels. Commercial bank profitability in Denmark was also cushioned by rising non-interest revenues from fee income such as mortgage refinancing and corporate advisory services, although such gains were partly offset by higher non-interest expenses.

Nonetheless, the effects of negative rates on bank profitability should continue to be closely monitored. It may be that some of the limited impact to date reflects a faster pass-through into the pricing of liabilities than assets, in which case profitability could weaken once there is a fuller repricing of loans in coming years, although the high share of variable rate loans in Sweden would suggest such effect would not be large. At least for Sweden, there is also potential for greater impact in 2016, as repo rates have averaged -0.5 percent, compared with close to -0.25 percent in 2015. If foreign bond yields were to rise, perhaps as a result of reduced monetary stimulus by the U.S. Federal Reserve, a rise in Swedish yields, including for covered bonds, may imply that low cost wholesale funding no longer provides such a cushion for profitability. It is also possible that some of the offsetting rise in non-interest income, such as from higher fees, may not be durable once loan refinancing is completed or due to competitive pressures on such fees. Although an erosion of bank profitability owing to such factors would not soon threaten the financial soundness of banks, possible risks to the quantity and quality of lending if profitability was compressed for an extended period require careful oversight.

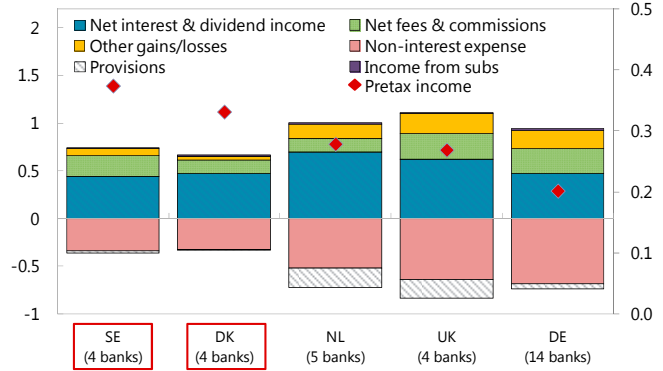
Box 1. Robust Danish and Swedish Bank Performance

Net interest income is higher for large Danish and Swedish banks than for other countries and they are also more profitable.

Data published by the European Banking Authority (EBA) at the highest level of consolidation shows that interest expense is lowest and the share of net interest income in banks' operating income is highest in Denmark and Sweden than in other countries.¹ Net fees and commission account for 22 percent of Danish banks' earnings structure, falling in between similar shares for banks in the Netherlands (15 percent) and Sweden (29 percent). Also, banks in Denmark and Sweden seem to rely less on trading and other income compared with other countries² and, considering their lower non-interest expense, they appear to be more cost efficient than other banks.³ With very low loan loss provisions, their overall pretax return on assets for 2015H1 ranks high on average compared with peer banks in neighboring countries.

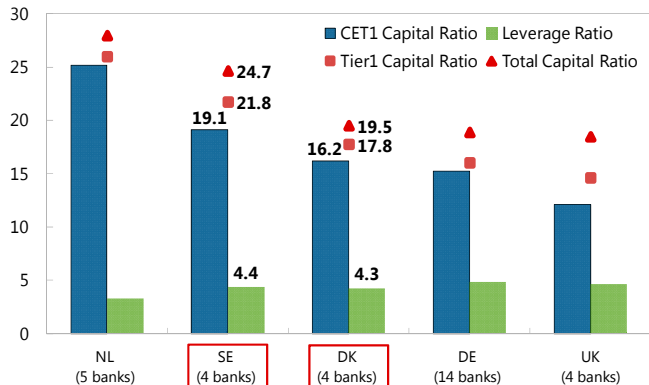
Large Danish and Swedish banks are also adequately capitalized. These large financial conglomerates hold substantially more capital than the minimum requirement (DN, 2015b). At 20 and 25 percent for Danish and Swedish banks, respectively, total capital ratios are higher than those of banks in Germany and the UK. Whereas Danish and Swedish bank leverage ratios are slightly below banks in Germany and the UK, they exceed those of banks in the Netherlands.

Bank Earnings Components, June 2015 1/
(In percent of total assets)



Sources: Adapted from Turk (forthcoming), using data from the European Banking Authority.
1/ Data is provided at the highest group consolidation level.

Regulatory Capital and Leverage Ratios, June 2015
(In percent, weighted by bank assets)



Source: European Banking Authority, adapted from Turk (forthcoming).

¹ Bank operating income is the sum of net interest income, net fees and commissions, and trading and other income, and does not include income from subsidiaries. See Appendix III for the list of banks considered by the EBA.

² Other gains/losses from trading and other income from financial securities are a more volatile source of income in comparison with traditional bank activities.

³ The ratio of non-interest expense to operating income is on average lower for Swedish and Danish banks (47 and 50 percent, respectively) than for Germany (74 percent), the Netherlands (53 percent), and the U.K. (58 percent).

Box 2. Consolidated versus Unconsolidated Bank Accounts

Bank activities examined at the consolidated level may mask the effect of negative interest rates in domestic markets. A number of Danish and Swedish banks operate across borders. To illustrate, the largest Danish banking group, Danske Bank A/S, operates in 15 countries including, among others, the three Baltic countries (Estonia, Latvia, and Lithuania), Finland, Ireland, Norway, Sweden, and the U.K. Thus, when examining the consolidated financial statements of Danske Bank A/S, the effect of Danish negative interest rates may be masked by variations generated from the bank's operations in foreign markets.¹

Consolidated accounts do not reveal potential differences in the effect of negative rates across different business segments. The universal banking model covers diverse activities, including corporate banking, home finance, trading, private wealth management, leasing, and insurance. Consolidated financial statements do not permit the assessment of how subsidiaries of a bank conglomerate operating in the same country but specializing in a different line of business (e.g., commercial banking and mortgage financing) are affected by negative rates. For instance, the Swedish Nordea Bank AB (publ) operates, among others, both a commercial and a mortgage bank subsidiary in each of Denmark (Nordea Bank Danmark A/S and Nordea Kredit Realkreditaktieselskab) and Sweden (Nordea Bank AB and Nordea Hypotek AB).

¹ While Danske Bank A/S (whose major foreign operations are in Sweden) is provided as an illustration to the general point that consolidated accounts do not reveal what happens at country level, most Danish banks have no or very limited operations in foreign countries.

Appendix I. Cost of Funding from Covered Bonds in Sweden

Swedish banks issue about 80 percent of their covered bonds in Swedish Krona and the rest in foreign currency mostly euro. Covered bonds finance long-term mortgages in SEK, where variable rate mortgages with fixation period of less than 3 months predominate.¹⁸ To hedge against interest rate risk, banks engage in interest rate swap contracts for their funding from covered bonds, effectively replacing the fixed interest payments due with variable payments linked to money market rates, which better match the interest payments due on mortgages. For their covered bond funding in foreign currency, they also hedge against FX risk.

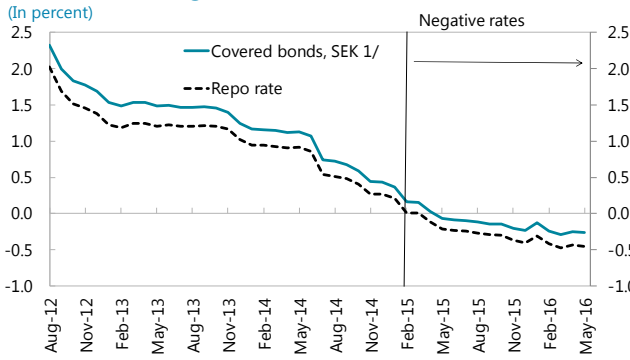
As a result, the cost of wholesale funding from covered bonds in SEK can be proxied by the 3-month Stibor plus the cost of interest hedging, where the latter is the difference between the yield on the SEK covered bond and that on the SEK interest rate swap of the same maturity. A similar approach is used to estimate the cost of wholesale funding from covered bonds in EUR, as the sum of the 3-month Euribor and interest hedging costs (EUR covered bond yield—EUR interest swap yield), but to which the cost of a cross-currency basis swap SEK/EUR is also added.

In making estimates of the cost of covered bond costs, there is a need to recognize that only a portion of covered bonds are rolled over each period. It is assumed that new hedging is contracted for only the newly issued bonds, with so the hedging costs for the portfolio of outstanding covered bonds is estimated as a moving average over time consistent with the average maturities of SEK covered bonds (3 years) and EUR covered bonds (2 years). The overall cost from covered bond funding is the weighted average of the funding in SEK and EUR, using the shares of new covered bond issuance as weights.

¹⁸ 70 percent of housing loans have an original fixation period of less than 3 months in Sweden.

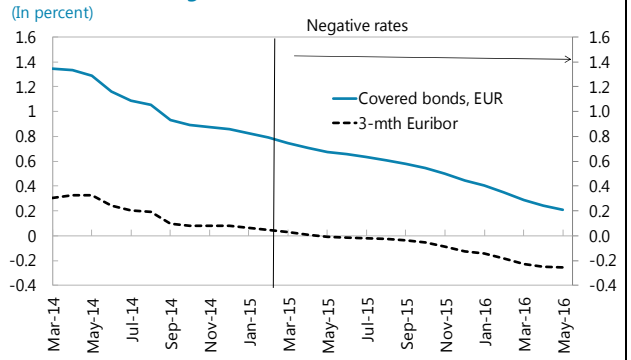
Figure A. Cost of Funding from Covered Bonds in Sweden

Estimated Funding Cost on Covered Bonds in SEK



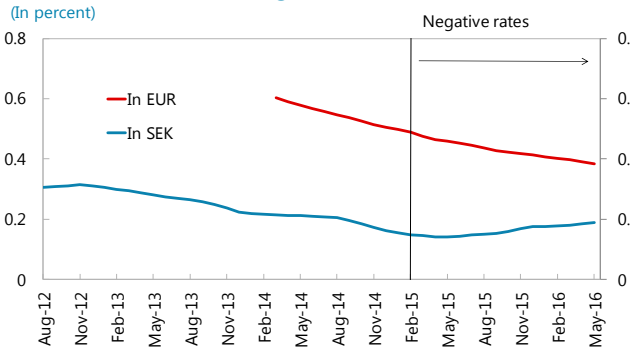
Sources: Haver and Fund staff calculations.
 1/ 3-month Stibor + credit spread (SEK covered bond yield - SEK interest rate swap yield over Stibor) averaged over 3 years.

Estimated Funding Cost on Covered Bonds in Euros 1/



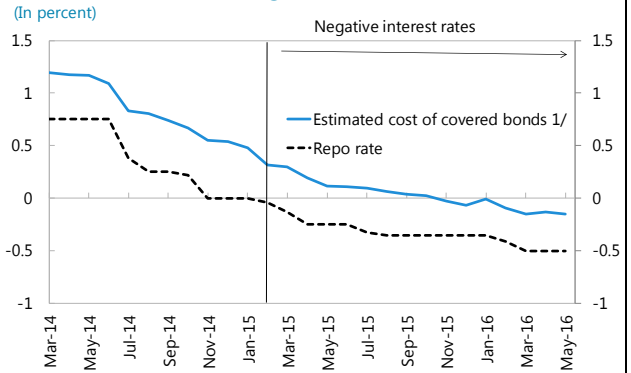
Sources: Bloomberg, Haver, and Fund staff calculations.
 1/ 3-month Euribor + credit spread (EUR covered bond yield - EUR interest rate swap yield over Euribor) averaged over 2 years + cost of EUR/SWE FX swap.

Cost of Interest Rate Hedge 1/



Sources: Bloomberg, Haver, and Fund staff calculations.
 1/ Moving average of estimated credit spread (covered bond yield - interest rate swap yield) over 3 and 2-year windows for SEK and EUR covered bonds, respectively.

Overall Estimated Funding Cost on Covered Bonds



Sources: Bloomberg, Haver, Statistics Sweden, and Fund staff calculations.
 1/ Weighted average of estimated funding cost on covered bonds in SEK and Euros.

Appendix II. Commercial and Mortgage Banks Considered at the Unconsolidated Level

Denmark		Sweden	
Commercial Bank	Mortgage Bank	Commercial Bank	Mortgage Bank
Danske Bank A/S	Nordea Kredit Realkreditaktieselskab	Nordea Bank AB (publ)	Nordea Hypotek AB (publ)
Jyske Bank A/S	Nykredit Realkredit A/S	Skandinaviska Enskilda Banken AB	Stadshypotek AB
Nordea Bank Danmark A/S	Realkredit Danmark A/S	Svenska Handelsbanken	Swedbank Hypotek AB- Swedbank Mortgage AB
Sydbank A/S	Totalkredit A/S	Swedbank AB	

Appendix III. Banks Included in the EBA Dataset at the Highest Consolidated Level

Country	Bank Name
Germany	Landeskreditbank Baden-Württemberg-Förderbank DekaBank Deutsche Girozentrale Erwerbsgesellschaft der S-Finanzgruppe mbH & Co. KG NRW.BANK, Düsseldorf Deutsche Apotheker-und Ärztebank eG Hypo Real Estate Holding AG Münchener Hypothekenbank eG Deutsche Zentral-Genossenschaftsbank AG HASPA Finanzholding VW Financial Services AG Landwirtschaftliche Rentenbank Deutsche Bank AG Commerzbank AG Landesbank Baden-Württemberg Landesbank Hessen-Thüringen Girozentrale NORD/LB Norddeutsche Landesbank Girozentrale WGZ BANK AG Westdeutsche Genossenschafts-Zentralbank Aareal Bank AG HSH Nordbank AG Bayerische Landesbank
Denmark	Jyske Bank Sydbank Nykredit Realkredit Danske Bank
Finland	OP-Pohjola Group
Netherlands	N.V. Bank Nederlandse Gemeenten ING Groep N.V. SNS REAAL N.V. ABN AMRO Groep N.V. Coöperatieve Centrale Raiffeisen-Boerenleenbank B.A. Nederlandse Waterschapsbank N.V.
Norway	DNB ASA
Sweden	Nordea Bank - group Skandinaviska Enskilda Banken - group Swedbank - group Svenska Handelsbanken - group
United Kingdom	The Royal Bank of Scotland Group Public Limited Company Lloyds Banking Group Plc Barclays Plc HSBC Holdings Plc

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